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Nuclear Energy University Programs (NEUP) Fiscal Year (FY) 2016 Annual Planning Webinar

IRP-FC-2: Cask Mis-Loads Evaluation Techniques

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August 2015

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Introduction

- **Many types and designs of spent nuclear fuel casks and containers currently in storage**
- **Inventory of spent fuel in these casks/containers is large and with varying burn-up rates and out-of-reactor times and they have multiple internal components**
- **Long-term internal stability of the internals and spent fuel and its cladding is important to maintain sub-criticality**
- **The challenge is to assess the condition of the internals and the spent nuclear fuel non-intrusively during the Normal Conditions of Transport (NCT) and Hypothetical Accident Conditions (HAC)**
- **This topic addresses the development of innovative technologies to determine and catalogue the extent of any damage or degradation of internal components during transport that includes NCT and possibly HAC**

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Background

- **Non-destructive examination techniques currently in use or new innovative techniques where surface damage and in some cases volumetric assessments can be performed on a reasonable scale on concrete or metal components**
- **Technology limited with layered and inaccessible components with different materials and varying gaps between the layers**
- **Needed are fundamental technologies to discern the condition of the internals of a spent fuel storage cask/container (baskets and assemblies) during NCT and HAC that are specified in the NRC transportation regulations (10CFR71) with a high degree of reliability**
- **Prior work focused on static applications after prolonged storage while this work focuses on dynamic applications during transport**

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Objective

- **New technology/technologies to support the design of simplified tools that can be used for assessing, cataloguing, sorting and isolating any operationally degraded casks/canisters during transport**

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Work to be Performed

- Innovative methodology development
- Proof of principle evaluation
- Identify and quantify inherent uncertainties
- Develop and implement a “mock-up” test program
- Prepare a detailed final report

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Tasks to be Performed

- **Task 1: Development of an integrated plan describing the technology development and testing – at 3 – 5 months**
- **Task 2: Methodology development – at 9 months**
- **Task 3: Proof of principle testing and uncertainty evaluation – at 15 – 18 months**
- **Task 4: Develop and implement "mock-up" tests – at 26 – 32 months**
- **Task 5: Analysis of test results and benchmarking of model at 33 – 40 months**
- **Task 6: Complete project report – at 48 months**

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Deliverables

- **Technology assessment report – 24 months after beginning of performance period**
- **Final project report – 48 months after beginning of performance period**